



Physics of Regolith Impacts in Microgravity Experiment

Problem Statement

- Understand how to safely and efficiently operate equipment and scientific instruments on the surface of a dust-covered object with low surface gravity.
- This flight campaign provides data on the response of regolith to low-energy disturbances in very low gravity environments.
- NASA exploration division and planetary scientists are the prime beneficiaries of PRIME.

Technology

Development Team

- Dr. Joshua Colwell, University of Central Florida, jec@ucf.edu.
- Experiment funding is provided by the Center for Microgravity Research and Education at the University of Central Florida. The P.I. (Colwell) is the point of contact.
- NASA is the most likely partner in this technology development.

Proposed Flight Experiment

Experiment Readiness:

- The experiment will be ready to fly August 15, 2012.

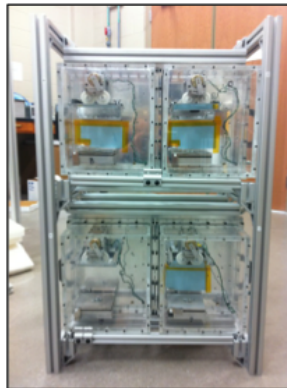
Test Vehicles:

- PRIME is designed for flight on parabolic airplane flights.

Test Environment:

- The experiment has flown in zero-g parabolic flights before. The requested test environment is zero-g parabolic flights.

Test Apparatus Description:



The experiment consists of a frame containing 8 removable impact chambers. A high-speed digital camera is attached to each impact chamber which is allowed to free float during the parabola. The opening of the target tray door and the firing of the projectile are operated by a single electronic control.

Technology Maturation

- Successful operation of the experiment in free-float mode will advance the TRL from TRL-6 to TRL-8. Successful operation means the projectile impacts the target at the correct speed during free-float conditions and usable high-speed video data is collected.
- We have implemented automated control of the launcher and target trays and need to test it in the zero-g environment.
- There is no deadline.

Objective of Proposed Experiment

- Investigate the behavior of fine particles in dusty environments in response to human and robotic activities to provide a guide to mitigating against dust contamination in manned and unmanned exploration of the Moon, Mars, and asteroids.
 - Flight data consists of high-speed video. Analysis of the data will indicate whether the technology performed as designed.

List the applicable Technology Areas addressed by your technology: TA06, TA07, TA08